Updated analysis of size and age composition of the SBT caught by Taiwanese
longliners in 2017 and the preliminary ageing data in 2018

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Taiwan has instituted an observer system to collect fishery data and biological samples for southern bluefin tuna (*Thunnus maccoyii*, SBT) in the Indian Ocean since 2002. The collected data and samples (otoliths) have provided valuable information on the SBT catch by Taiwanese longliners. In CCSBT-ESC-23, we have reported the preliminary otolith ageing data for the SBT collected in 2017. In this document, we included more ageing data to update the direct otolith aging data and the estimated age composition of the SBT caught by Taiwanese longliners in 2017. The preliminary ageing data for the SBT caught in 2018 are also reported herein.

The scientific observers only collected otoliths from 23 SBT on the longline vessels in 2017 and we further collected 307 SBT otoliths in the tuna processing factories in Kaohsiung harbor. Their ages were determined according to ageing manual (Anonymous 2002). The SBT sampled for the otoliths by the observers were skewed toward small-sized fish (Figure 1a) with ages between 1-3 years (Figure 1b). The SBT sampled in the factories showed bimodal distribution between 90 to 170 cm with relatively fewer samples between 130-140 cm (Figure 2a). The determined ages ranged from 2-25 years with approximately 70% of the samples between 3-5 years (Figure 2b). The aged samples were used to construct an age-length key (Table 1), which was used to covert the length frequency data to age composition of the total catch in 2017 (Figure 3). The estimated age compositions ranged from 1-25 years, with approximately 75% catches between 3-5 years. The 4-year-old fish was the most abundant age class followed by 3 and 5 year-old fish. The unexpected low percentages of 6-7 year-old fish were suspicious and might be underestimated due to the insufficient samples at the size between 130-140 cm. In addition, the percentage variations for the SBT larger than 10 years shall be interpreted with cautions because very few otoliths were collected from the SBT larger than 10 years.

In 2018, scientific observers collected 30 pairs of SBT otoliths from the central Indian Ocean. The ages of the fish ranged from 2-4 years, suggesting the sampling still skewing toward small-sized and young fish (Figure 4). We also collected 132 pairs of SBT otoliths from the factories in Kaohsiung harbor. The ages of these samples ranged from 2-11 years with the most abundant fish of 3 years, followed by the 4 and 2 years (Figure 5). We will collect more samples from factories in Kaohsiung harbor and will report the final data in the next meeting.

Reference

Anonymous (2002) A manual for age determination of southern bluefin tuna Thunnus maccoyii: otolith sampling, preparation and interpretation. Report of the Direct Age Estimation Workshop. 11-14 June 2002, Victoria, Australia.

Shiao JC (2018) Otolith collection and direct aging of SBT caught by Taiwanese longliners in 2014–2017. Report to CCSBT_ESC_23.

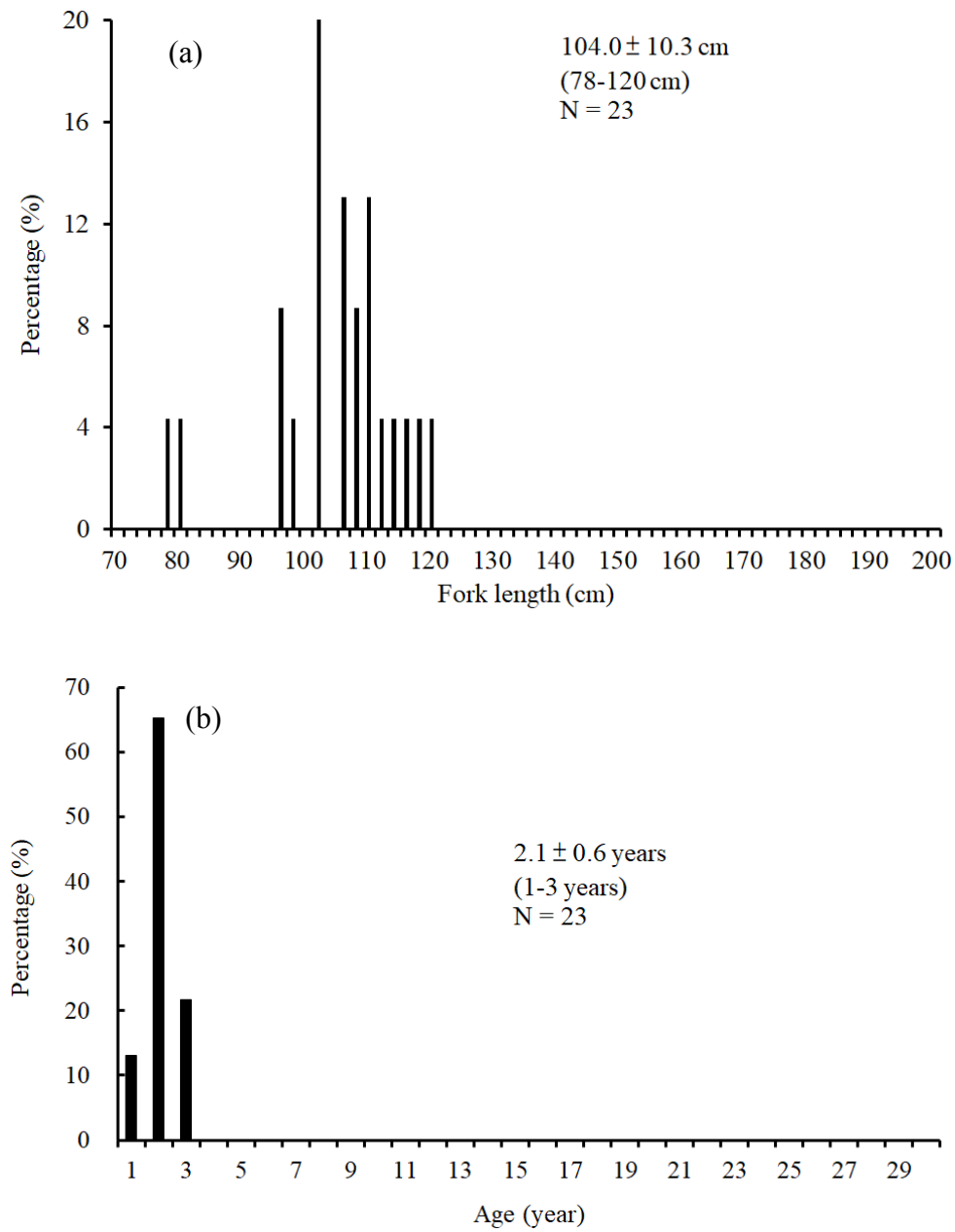Figure 1. Size (a) and age (b) of the SBT sampled for otoliths by the scientific observers in 2017.

Figure 2. Size (a) and age (b) composition of the SBT collected from tuna processing factories. The fish were caught by Taiwanese longliners in 2017.
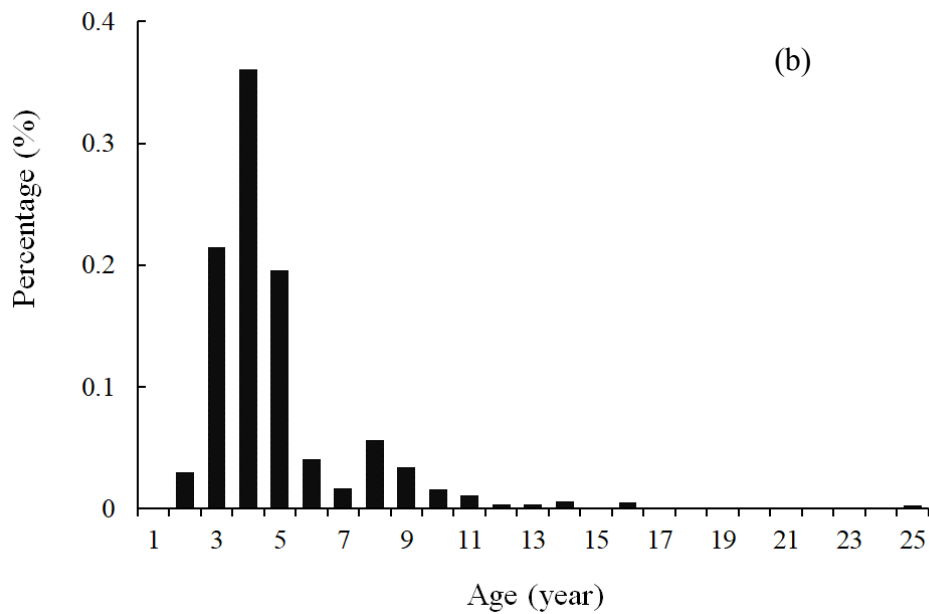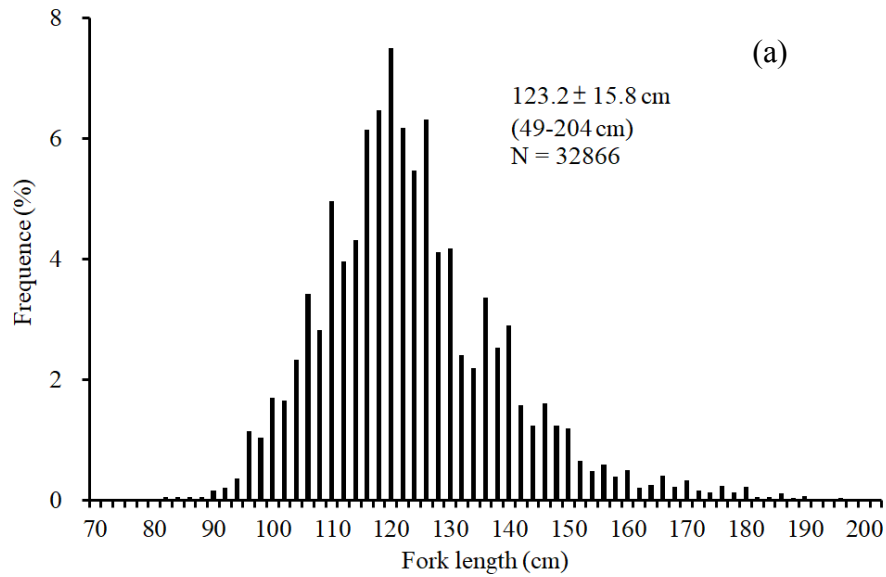
Figure 3. Size compositions (a) of the SBT total catch in 2017 and the estimated age composition based on direct ageing data. The percentage of the SBT aged 6 and 7 years were likely underestimated.

Figure 4. Size (a) and age (b) of the SBT sampled for otoliths by the scientific observers in 2018.
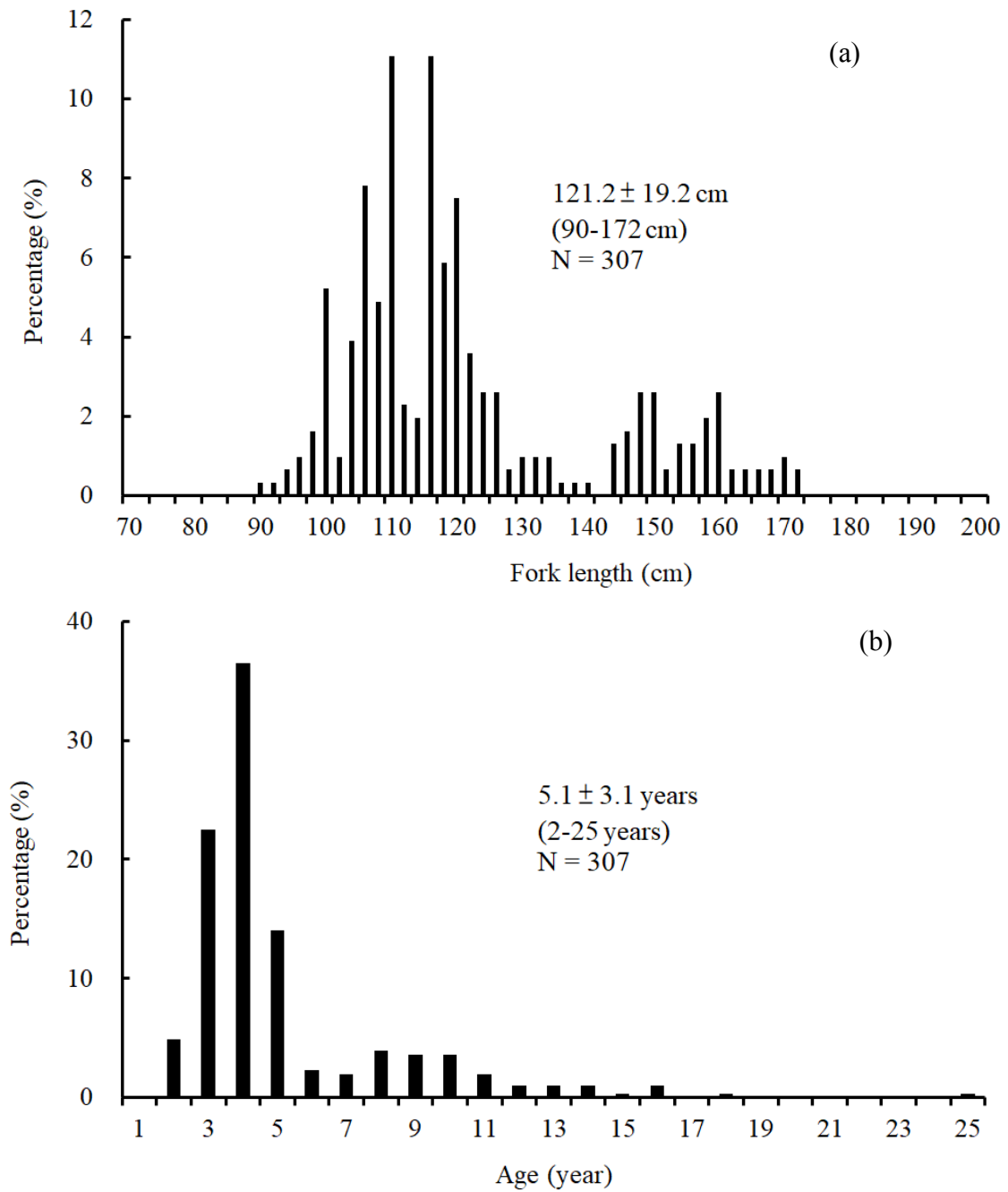
Figure 5. Size (a) and age (b) composition of the SBT collected from tuna processing factories. The fish were caught by Taiwanese longliners in 2018.
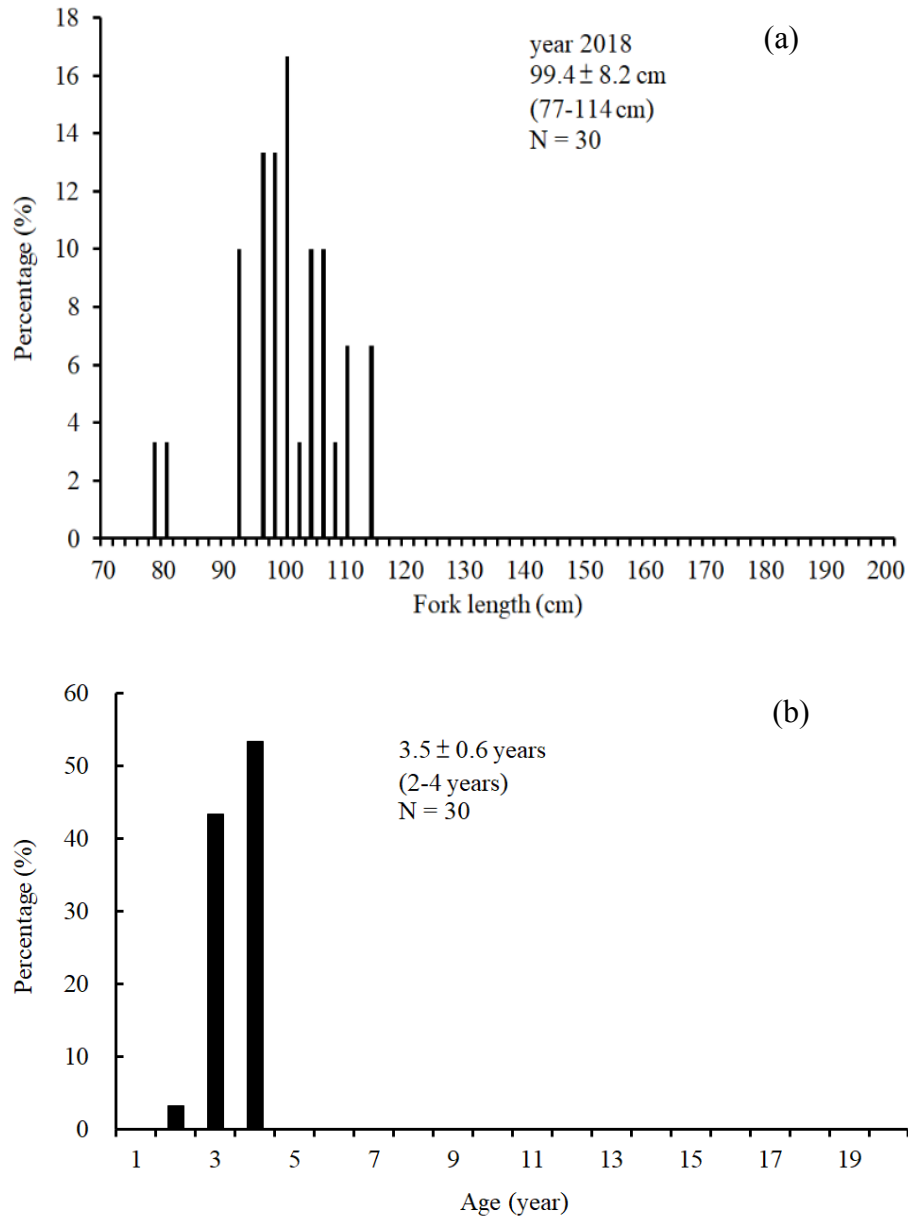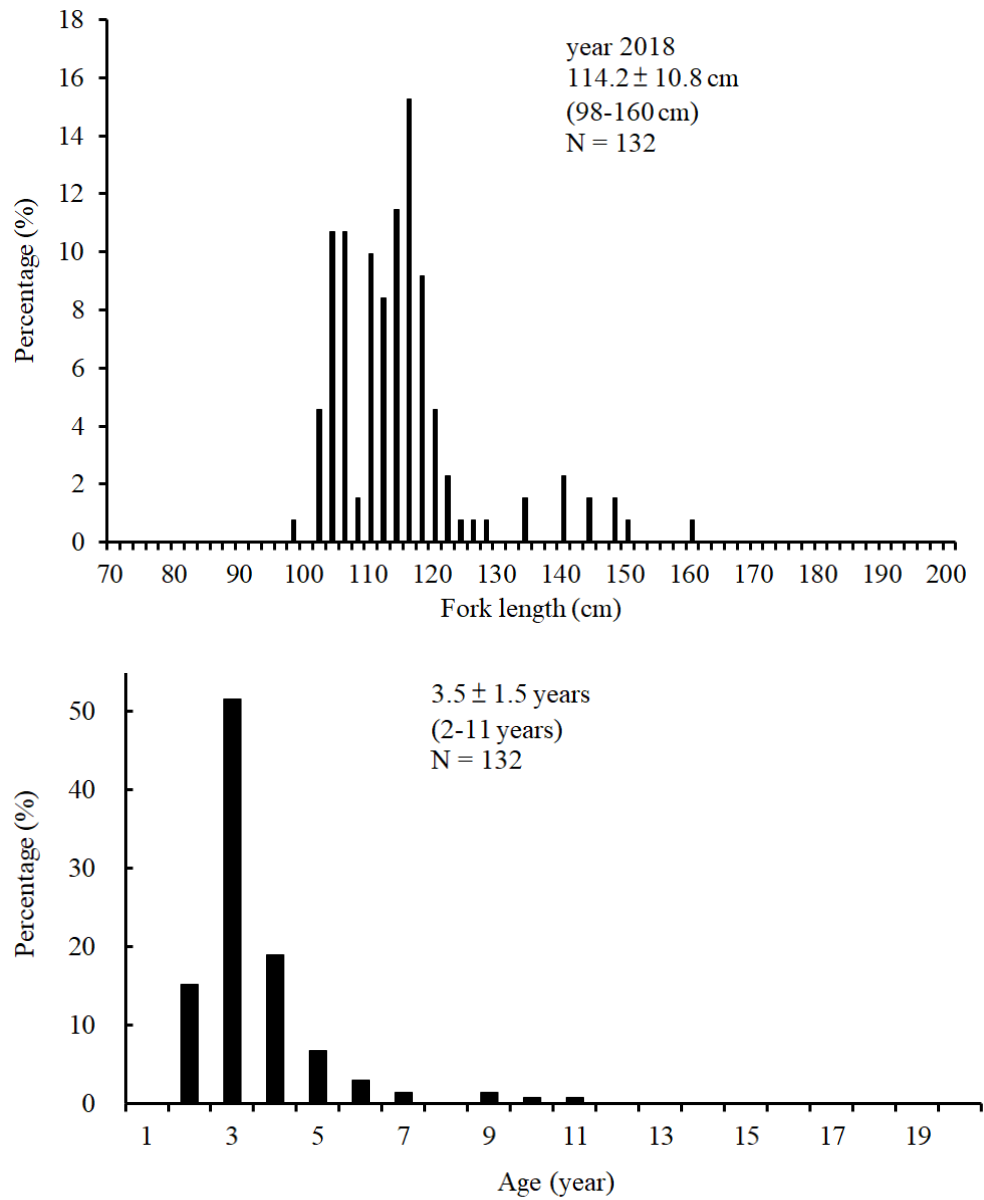
Table 1. Age-length key of the SBT collected in 2017. A1-A25 were age aged estimated by otolith annuli. FL: fork length. N: sample size.

FL\Age	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	N-FL
< 100	0.11	0.32	0.42	0.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19
100-110	0	0.23	0.3	0.4	0.05	0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83
110-120	0	0.05	0.25	0.52	0.18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103
120-130	0	0	0.28	0.41	0.24	0.08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51
130-140	0	0	0.09	0.18	0.36	0.09	0	0.18	0.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
140-150	0	0	0	0	0.18	0.05	0.18	0.32	0.14	0.05	0.05	0	0	0.05	0	0	0	0	0	0	0	0	0	0	0	22
150-160	0	0	0	0	0	0	0.05	0.09	0.27	0.27	0.05	0.14	0.09	0.05	0	0	0	0	0	0	0	0	0	0	0	22
160-170	0	0	0	0	0	0	0.06	0.06	0.06	0.25	0.19	0	0.06	0.06	0.06	0.13	0	0.06	0	0	0	0	0	0	0	16
170-180	0	0	0	0	0	0	0	0	0	0	0.33	0	0	0	0	0.33	0	0	0	0	0	0	0	0	0.33	3
N-Age	3	30	74	112	43	7	6	12	11	11	6	3	3	3	1	3	0	1	0	0	0	0	0	0	1	330